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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,851	09/23/2005	Kazuhide Hasebe	33082M274	3704
441 7590 07/02/2007 SMITH, GAMBRELL & RUSSELL 1850 M STREET, N.W., SUITE 800 WASHINGTON, DC 20036			EXAMINER PATEL, REEMA	
			ART UNIT 2812	PAPER NUMBER
			MAIL DATE 07/02/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/549,851

Applicant(s)

HASEBE ET AL.

Examiner

Reema Patel

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 2,3,13 and 14 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-12 and 15-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 September 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 9/23/05, 7/6/06, 8/24/06.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election of group I, claims 1, 4-12, 15-20, in the reply filed on 6/8/2007 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statements (IDS) were submitted on 9/23/2005, 7/06/2006, and 8/24/2006. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statements have been considered by the examiner.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 5, 7-9, and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Bolscher et al. (U.S. 6,468,903 B2).

6. Regarding claim 1, Bolscher et al. discloses the following claimed elements:

- A cleaning method of a film-forming unit, the method comprising:
 - A purging step of purging an inside of the reaction chamber by supplying into the reaction chamber a nitrogen-including gas that includes nitrogen and that is capable of being activated (col 2, line 63 – col 3, line 4),
 - Wherein the purging step has a step of nitriding a surface of a member in the reaction chamber by activating the nitrogen-including gas (col 2, line 63 – col 3, line 4).

7. Regarding claim 5, Bolscher et al. discloses the nitrogen-including gas is ammonia (col 2, lines 33-34).

8. Regarding claim 7, Bolscher et al. discloses the gas supplied to the reaction chamber is heated to a predetermined temperature (col 3, lines 4-12).

9. Regarding claim 8, Bolscher et al. discloses the inside of the reaction chamber is heated to a range of 600-1050° C (col 3, lines 4-12).

10. Regarding claim 9, Bolscher et al. discloses the member in the reaction chamber consists of quartz (col 2, lines 29-31).

11. Regarding claim 11, Bolscher et al. discloses a film-forming step of heating the inside of the reaction chamber containing the object to be processed to a predetermined temperature (col 2, line 67 – col 3, line 12), and forming a thin film on the object to be processed by supplying a process gas into the reaction chamber (col 3, lines 37-39).

12. Claims 12, 15, 18 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Rossman et al. (U.S. 6,121,161).

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13. Regarding claims 12 and 15, Rossman et al. discloses a film-forming unit comprising a cleaning-gas supplying unit (28, Fig. 1A; col 4, lines 5-34; col 9, lines 3-8), a nitrogen-including-gas supplying unit (28, Fig. 1A; col 4, lines 5-34; col 9, lines 12-14), an activating unit (32, Fig. 1A; col 4, lines 35-37), and a nitriding unit (31, Fig. 1A; col 5, lines 15-30).

14. Regarding claim 18, Rossman et al. discloses the activating unit is a plasma-generating unit (col 5, lines 15-30).

15. Regarding claim 20, Rossman et al. discloses a pressure-adjusting unit (31, Fig. 1A) that maintains the inside of the reaction chamber at a range of 133 Pa to 53.3 kPa (col 5, lines 15-30; col 9, lines 8-10).

16. Claims 12, 15, and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Doi (U.S. 5,900,161).

17. Regarding claims 12 and 15, Doi discloses a film-forming unit comprising a cleaning-gas supplying unit (18, Fig. 1; col 5, lines 33-38; col 4, lines 46-48), a nitrogen-including-gas supplying unit (17, Fig. 1; col 4, lines 5-34; col 2, lines 7-13), an activating unit (22, Fig. 1; col 5, lines 38-49), and a nitriding unit (col 5, lines 38-49).

18. Regarding claim 16, Doi discloses that the nitrogen-including-gas is ammonia (col 2, lines 7-13).

Claim Rejections - 35 USC § 103

19. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

20. Claims 4-5, 7-9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bolscher et al. (U.S. 6,468,903 B2) in view of Shugrue (U.S. 6,095,158).

21. Regarding claim 4, Bolscher et al. discloses the following claimed elements:

- A cleaning method of a film-forming unit that forms a thin film on an object to be processed by supplying a process gas into a reaction chamber containing the object to be processed, the method comprising:
 - A deposit-removing step of removing a deposit stuck to an inside of the film-forming unit (col 2, line 58-62);
 - A purging step of purging an inside of the reaction chamber by supplying into the reaction chamber a nitrogen-including gas that includes nitrogen and that is capable of being activated (col 2, line 63 – col 3, line 4),
 - Wherein the purging step has a step of nitriding a surface of a member in the reaction chamber by activating the nitrogen-including gas (col 2, line 63 – col 3, line 4).

22. Yet, Bolscher et al. discloses that the deposit-removing step occurs by supplying aqueous HF (col 2, lines 58-62) and not a fluorine-containing gas. However, Shugrue discloses a method for cleaning a processing chamber using a fluorine-containing compound such as HF in its gaseous form since it is easier to deliver to all areas of the chamber interior than when an aqueous solution of HF is used. Moreover, when

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gaseous HF is used, a lesser amount is required as needed if aqueous HF were used (col 6, lines 8-15).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Bolscher et al. with the deposit removing step occurring by supplying a cleaning gas rather than an aqueous solution so as to deliver the cleaning agent to all areas of the chamber interior with more ease and use a lesser quantity of the cleaning agent.

23. Regarding claims 5 and 7-9, Bolshcer et al. discloses the nitrogen-including gas is ammonia (col 2, lines 33-34), the gas supplied to the reaction chamber is heated to a predetermined temperature (col 3, lines 4-12), the inside of the reaction chamber is heated to a range of 600-1050° C (col 3, lines 4-12), and the member in the reaction chamber consists of quartz (col 2, lines 29-31).

24. Regarding claim 11, Bolscher et al. discloses a film-forming step of heating the inside of the reaction chamber containing the object to be processed to a predetermined temperature (col 2, line 67 – col 3, line 12), and forming a thin film on the object to be processed by supplying a process gas into the reaction chamber (col 3, lines 37-39).

25. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bolscher et al. (U.S. 6,468,903 B2) as applied to claim 1 and over Bolsher et al. (U.S. 6,468,903 B2) in view of Shugrue (U.S. 6,095,158) as applied to claim 4 above.

26. Regarding claim 6, Bolscher et al. discloses the pressure is maintained at approximately 66 Pa (col 3, lines 6-12) but discloses that the exact value of the process

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conditions do not appear to be critical. The examiner notes that the applicant does not teach that the particular pressure range, as recited in claim 6, of 133 Pa – 53.3 kPa solves any stated problem or is for any particular purpose other than a stated experimental condition of the process. Therefore, the pressure range given in claim 6 lacks criticality in the claimed invention and does not produce unexpected or novel results. Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to maintain the pressure in a range of 133-53.3 kPa since the invention would perform equally well at a pressure of 66 Pa.

27. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bolscher et al. (U.S. 6,468,903 B2) as applied to claim 1 above and over Bolsher et al. (U.S. 6,468,903 B2) in view of Shugrue (U.S. 6,095,158) as applied to claim 4 above.

28. Regarding claim 10, Bolscher et al. discloses the nitrogen-including gas is an ammonia gas (col 2, lines 33-34) and also discloses that the film-forming apparatus can form a silicon nitride film (col 3, lines 37-39). Yet, Bolscher et al. is silent with regards to the process gas that can be used to form such a film. However, the examiner takes Official Notice that the use of ammonia and a Si-containing gas as process gases in forming a silicon nitride film is well known in the art (see for example, Agusta et al. (U.S. 3,865,652), col 3, lines 45-53). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Bolscher et al. with forming the silicon nitride film using a process gas comprising

ammonia and a silicon-including gas so as to use readily available silicon nitride-forming precursors.

29. Claims 17 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rossman et al. (U.S. 6,121,161) as applied to claims 12 and 15 above, and further in view of Frankel et al. (U.S. 6,444,037 B1).

30. Regarding claims 17 and 19, Rossman et al. discloses the activating unit in the film-forming unit is a plasma-generating unit. However, Frankel et al. discloses the use of a heater (25, Fig. 1A) in a film-forming apparatus as an activating unit in a process to season chamber walls during cleaning (col 13, lines 58-64). Furthermore, Frankel et al. discloses the heater heats the inside of the reaction chamber to 400-800 °C (col 13 , lines 58-61), which is within the range of 600-1050 °C. An advantage of using a heater as an activating unit is that the use of thermal activation prevents the formed film from undergoing damage caused by plasma generation. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Rossman et al. with the activating unit as a heating unit that heats the inside of the reaction chamber to a range of 600-1050 °C so as to prevent plasma damage to the formed film.

Conclusion

31. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Nagashima et al. (U.S. 5,129,958) and Entley et al (U.S. 6,872,323 B1) disclose cleaning methods for semiconductor wafer apparatuses.

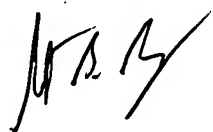
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Reema Patel whose telephone number is 571-270-1436. The examiner can normally be reached on M-F, 8:00-4:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentritt can be reached on 571-272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

RSP
6/25/07

SCOTT B. GEYER
PRIMARY EXAMINER

 6/25/07